

# KleenSpec® 790 Series Cordless Illumination System for the 590 Series Vaginal Speculum

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Patents pending.

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**WelchAllyn®**

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## Introduction

The Welch Allyn KleenSpec® 790 series cordless illumination system can be used with or without the KleenSpec 590 series disposable vaginal speculum. The cordless illumination system consists of the following items.



## Intended use

When used with the vaginal speculum, the cordless illuminator provides illumination during pelvic examinations and other gynecological procedures, such as pap smears, dilation and curettage (D&C) biopsy, and electrosurgery.

The cordless illuminator can be used independent of the speculum as a general-purpose light source.

## Contraindications

The 790 series illuminator (either by itself or in conjunction with a 590 series speculum) is not intended to be used for eye examinations.

The 790 series illuminator (either by itself or in conjunction with a 590 series speculum) is not intended to be used for diagnosis.




## User profile

The intended users of the illuminator are medical professionals who are qualified to perform a pelvic examination.






## Symbols

The symbols illustrated on the following pages may appear in this manual or on the illuminator, charging station, auxiliary power cord, packaging, or shipping container.

**Table 1. Documentation symbols**

	<b>WARNING</b>	In this manual, this symbol and “WARNING” indicate conditions or practices that could lead to illness, injury, or death.
	<b>Caution</b>	In this manual, this symbol and “Caution” indicate conditions or practices that could damage the equipment or other property.
		On the product, this symbol means consult accompanying documentation.









**Table 2. Shipping, storing, and environment symbols**

	This end up		Keep dry
	Fragile		Relative humidity limit
	Temperature limits		

**Table 3. Certification symbols**

	Meets essential requirements of European Medical Device Directive 93/42/EEC.
	European Regulatory Manager Welch Allyn LTD. Navan Business Park, Dublin Road Navan, County Meath, Republic of Ireland Tel.: +353 46 90 67700 Fax: +353 46 90 67755
	Complies with applicable U.S. and Canadian medical safety standards.
	EMC framework of Australia

**Table 4. Operation symbols**

	Warning, LED beam
	Caution, hot surface
	Type BF applied part
	Alternating current
	Direct current
	Double insulation
IPXØ	Not protected from the ingress of liquid.
	Recycle the product separately from other disposables. See <a href="#">“Recycling the system components”</a> on page 11.
	Power plug

## Using the system safely

Before using the cordless illumination system, you must read and understand the following safety-related information.

### General warnings

The following warning statements apply to use of the cordless illumination system in general. Warning statements that apply specifically to particular procedures, such as cleaning, appear in the corresponding sections of the manual.

Warning statements indicate conditions or practices that could lead to illness, injury, or death.



**WARNING** LED radiation. Class 2 LED product. To avoid eye injury, do not stare into beam.



**WARNING** The illuminator may generate heat after prolonged use.

- Operation time limits: Illuminator with speculum  $\leq 10$  minutes on,  $\geq 5$  minutes off between uses. Illuminator alone  $\leq 2$  minutes on,  $\geq 5$  minutes off between uses.
- Illuminator could be harmful to skin if touched after being on for extended times.
- To avoid fire, do not place illuminator onto a flammable surface if LED is on.
- Illuminator is not suitable for use in the presence of a flammable anesthetic mixture with air or oxygen or nitrous oxide. An explosion may result.



**WARNING** To prevent shock hazards, the power outlet must be properly grounded. Grounding reliability is achieved only when connected to hospital-use or hospital-grade receptacles.

**WARNING** The illuminator is not intended to be used for eye examinations.

**WARNING** The illuminator is not intended to be used for diagnosis.

**WARNING** The illuminator is intended to be used by trained medical professionals.





**WARNING** This product comes with a power supply and/or power cord that is intended for use only with this product. The power supply and/or power cord have not been tested and approved for use with other products that may have the same power connectors. If you cannot locate the original power supply and/or power cord, please contact Welch Allyn to obtain replacement parts.

## General cautions

The following caution statements apply to use of the cordless illumination system in general. Caution statements that apply specifically to particular procedures, such as pelvic examinations, appear in the corresponding sections of the manual.

Caution statements indicate conditions or practices that could damage the equipment or other property.



**Caution** The cordless illuminator could be a biohazard after use. Follow good hospital practices. See “[Cleaning and disinfecting](#)” on page 10.

**Caution** Cordless illuminator, charging station, and auxiliary power cord are not protected from the ingress of liquid.

**Caution** There are no user-serviceable parts inside the device. In case of a malfunction, call Welch Allyn and precisely describe the problem.

**Caution** This device complies with current required standards for electromagnetic interference and should not present problems to other equipment or be affected by other devices. As a precaution, avoid using this device in close proximity to other equipment.

**Caution** Use only Welch Allyn-approved parts. See “[Part numbers](#)” on page 15.

## Utilisation sécuritaire du système

Avant d'utiliser le système d'éclairage sans fil, vous devez bien lire et comprendre les renseignements de sécurité suivants.

### Avertissements généraux

Les avertissements suivants s'appliquent à l'utilisation du système d'éclairage sans fil en général. Les avertissements qui s'appliquent à des procédures particulières, comme le nettoyage, sont abordés dans les sections correspondantes de ce manuel.

Ces avertissements indiquent des conditions ou des pratiques qui pourraient causer des maladies, des blessures ou des décès.



**AVERTISSEMENT** Rayonnement de la DEL. Produit DEL de classe 2. Pour éviter les blessures aux yeux, ne regardez pas directement le faisceau lumineux.



**AVERTISSEMENT** Le système d'éclairage peut dégager de la chaleur après une utilisation prolongée.

- Les durées d'opération maximales : Illuminateur avec spéculum  $\leq 10$  minutes de marche,  $\geq 5$  minutes d'arrêt entre les utilisations. Illuminateur seul  $\leq 2$  minutes de marche,  $\geq 5$  minutes d'arrêt entre les utilisations.
- Le système d'éclairage peut causer des brûlures cutanées si vous y touchez après une utilisation prolongée.
- Pour éviter les risques d'incendie, ne déposez pas le système d'éclairage sur une surface inflammable lorsque la DEL est allumée.
- Le système d'éclairage ne devrait pas être utilisé en présence d'un mélange d'anesthésique inflammable et de l'air ou encore d'oxygène ou d'oxyde nitreux. Cela pourrait causer une explosion.



**AVERTISSEMENT** La prise électrique doit être correctement mise à la terre afin d'éviter les chocs électriques. Vous ne pouvez être certain de la mise à la terre que si l'appareil est branché dans une prise utilisée par les hôpitaux ou de qualité hospitalière.

**AVERTISSEMENT** Le système d'éclairage ne devrait pas être utilisé pour les examens des yeux.

**AVERTISSEMENT** Le système d'éclairage ne devrait pas être utilisé pour effectuer un diagnostic.

**AVERTISSEMENT** Le système d'éclairage est conçu pour être utilisé par des professionnels médicaux formés.



**AVERTISSEMENT** Un bloc d'alimentation et/ou un cordon d'alimentation, destinés à une utilisation avec ce produit seulement, sont fournis avec le produit. Le bloc d'alimentation et/ou le cordon d'alimentation n'ont pas été testés et approuvés pour une utilisation avec d'autres produits qui pourraient être munis des mêmes connecteurs d'alimentation. Si vous n'avez plus le bloc d'alimentation et/ou le cordon d'alimentation originaux, veuillez communiquer avec Welch Allyn pour obtenir des pièces de remplacement.

## Mises en garde générales

Les mises en garde suivantes s'appliquent à l'utilisation du système d'éclairage sans fil en général. Les énoncés de mise en garde qui s'appliquent à des procédures particulières, comme les examens pelviens, sont abordées dans les sections correspondantes de ce manuel.

Les énoncés de mise en garde indiquent des conditions ou des pratiques qui pourraient endommager les équipements ou la propriété.



**Mise en garde** Le système d'éclairage sans fil pourrait être considéré à risque biologique après utilisation. Conformez-vous aux bonnes pratiques hospitalières. Voir "[Cleaning and disinfecting](#)" à la page 10.

**Mise en garde** Le système d'éclairage sans fil, la borne de recharge et le cordon d'alimentation auxiliaire ne sont pas protégés contre les infiltrations de liquide.

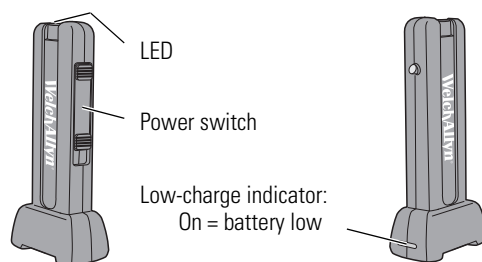
**Mise en garde** Cet appareil ne contient aucune pièce à entretenir. En cas de mauvais fonctionnement, appelez Welch Allyn et décrivez le problème de manière précise.

**Mise en garde** Cet appareil est conforme aux normes actuelles obligatoires sur les interférences électromagnétiques. Il ne devrait présenter aucun problème pour les autres équipements et ne devrait pas être affecté par d'autres appareils. Par mesure de précaution, évitez d'utiliser cet appareil à proximité d'autres équipements.

**Mise en garde** N'utilisez que des pièces approuvées par Welch Allyn. Voir "[Part numbers](#)" à la page 15.

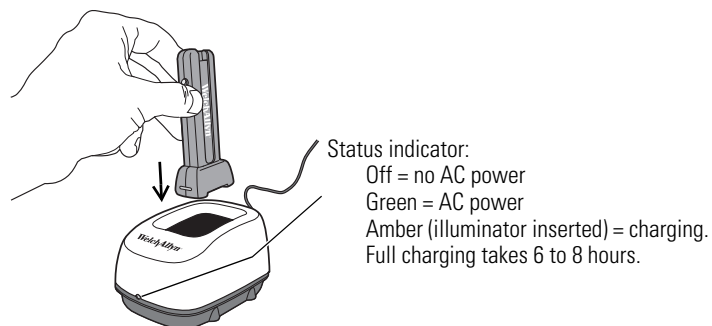
## Charging the illuminator

Charge the illuminator before using it the first time, or whenever its low-charge indicator turns on.



### To charge the illuminator

1. If LED is lit, turn power switch off.
2. Connect charging base to AC power.
3. Place the illuminator (either direction) into the charging station. Full charging takes 6 to 8 hours.

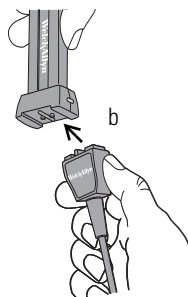
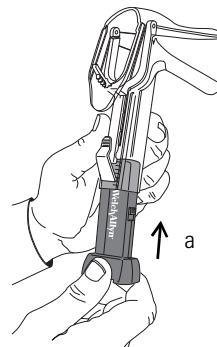


4. Remove the charged illuminator when you are ready to use it.

It is safe to leave the illuminator in the charging station after it is charged.

## Using the illuminator for a pelvic exam

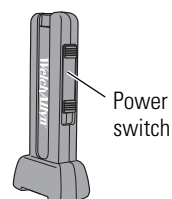
1. Fully insert the illuminator into a 590 series speculum (a). The LED automatically turns on.
2. Conduct the examination.
3. If the LED turns off, do not remove the speculum. Do either of these things:
  - Leave the illuminator in place, and use an **external light source**.
  - or
  - Connect the **auxiliary power cord** to AC power. Hold the speculum in place, and remove the illuminator. Connect the auxiliary power cord to illuminator (b). Reinsert the illuminator.
4. When finished, remove the speculum, and then remove the illuminator. The LED automatically turns off.



## Using the illuminator as light source

To use the illuminator as a light source, slide the power switch to turn it on (all the way down) and off (all the way up).

**Note** For operation time limits, see "Intermittent operation" on page 15.



## Maintenance

### Cleaning and disinfecting

Use CaviWipe® wipes for both cleaning and disinfecting.\*

\*EPA-approved intermediate-level disinfectant appropriately labeled as effective against TB mycobacterium tuberculosis (per AAMI TIR-12, 2004, section 5.2.3)



**Caution** Use only the cleaning and disinfection methods described in this manual. Clean the illuminator prior to disinfection.

#### To clean and disinfect the illuminator

1. After using the illuminator, unplug any power cords.
2. Clean the illuminator.
  - a. Following the wipe manufacturer's instructions, wipe the entire unit to completely remove any gross debris.
  - b. Gently wipe the gold contacts on the bottom with 70% alcohol. If debris builds up on these contacts, the charging or auxiliary power functions might be affected.
3. Disinfect the illuminator.
  - a. Following the wipe manufacturer's instructions, thoroughly wet the surface of the entire illuminator.
  - b. Using sterile gauze soaked with 70% isopropyl alcohol, thoroughly wet the surface of the entire illuminator. The treated surface must remain wet for five minutes. If needed, reapply the solution to keep the surface continuously wet during this time.
  - c. Allow the surface to dry.

#### To clean the charging base or auxiliary power cord

1. After using the charging base or auxiliary power cord, unplug the power cord.
2. Clean the component. Following the wipe manufacturer's instructions, wipe the surface to completely remove any gross debris.

## Inspecting the system

Examine all components of the cordless illumination system monthly. Components include the illuminator, charging station, and auxiliary power cord.

If any component is worn or damaged, replace it with the Welch Allyn-approved part. For ordering information, see “[Part numbers](#)” on page 15.

## Recycling the system components

### Within the EU

Do not dispose of this product as unsorted municipal waste. Prepare it for reuse or separate collection as specified by Directive 2002/96/EC of the European Parliament and the Council of the European Union on Waste Electronic and Electrical Equipment (WEEE).



If this product is contaminated, this directive does not apply.

For more specific disposal information, see [www.welchallyn.com/weee](http://www.welchallyn.com/weee), or contact Welch Allyn.

### Outside the EU

When the product reaches its end of life, recycle the components according to national, state, and local regulations, or return the product to Welch Allyn.

## Troubleshooting

If you try these suggestions and still have problems, contact Welch Allyn.

Problem	Probable causes & solutions
LED does not light.	Battery is low. Charge the illuminator.
	Illuminator is not seated correctly in speculum. Insert illuminator fully into speculum.
LED does not light when the auxiliary power cord is attached.	Auxiliary power cord is not plugged in. Plug the auxiliary power cord into an AC outlet.
	Auxiliary power cord is not seated properly. Plug the cord into the illuminator properly.
LED does not automatically turn off when removing the illuminator from the speculum.	Power switch is damaged or blocked. Clean the switch area. If the problem continues, replace the illuminator.
Illuminator does not charge in the charging base.	Charging base is not plugged in. Connect charging base to AC power.
	Illuminator is not seated properly in charging base. Reinsert the illuminator into the charging base, and verify that the status indicator glows amber.

## Contacts

For information about any Welch Allyn product, call the nearest Welch Allyn representative:

USA	1 800 535 6663 + 1 315 685 4560	Australia	+ 6129 638 3000 800 074 793
Canada	1 800 561 8797	China	+ 86 216 327 9631
European Call Center	+ 353 46 906 7790	France	+ 3315 569 5849
Germany	+ 49 747 792 7186	Japan	+ 8133 219 0071
Latin America	+ 1 305 669 9003	Netherlands	+ 3115 750 5000
Singapore	+ 656 419 8100	South Africa	+ 2711 777 7555
United Kingdom	+ 44 207 365 6780	Sweden	+ 46 85 853 6551



## Appendix

### Specifications

Item	Specification	
Auxiliary power cord transformer	<u>U.S. &amp; Canada</u>	<u>International</u>
Classification	Class I, type BF applied part	Class II, type BF applied part
Input	120 V ~ 60 Hz	90–264 VAC ~ 50–60 Hz, 200 mA
Output	5 VDC, 300 mA	5 VDC, 300 mA
Category	Not AP/APG equipment	Not AP/APG equipment
Charging station transformer	<u>U.S. &amp; Canada</u>	<u>International</u>
Classification	Class I	Class I, Class II
Input	120 V ~ 60 Hz	230 V (240 V in Australia) ~ 50 Hz
Output	9.8 VDC, 150 mA	7.5 – 9.2 VDC , 200 mA
Category	Not AP/APG equipment	Not AP/APG equipment
Power cord length		
Auxiliary power cord	305 cm (120 in)	
Charging station	92 cm (36 in)	
Weight		
Illuminator	48 g (0.1 lb)	
Charging station (base and power cord)	142 g (0.31 lb)	
Auxiliary power cord	290 g (0.64 lb)	
Battery cell		
Capacity	700 mAh	
Voltage	3.7 V	
Chemistry	Li-ion (single lithium ion)	
Protection against ingress of water, per IEC 60529 (illuminator, auxiliary power cord, charging station)	IPX0	
Operating conditions		
Temperature	+10° C to +35° C (+50° F to +95° F)	
Relative humidity	30% to 75% noncondensing	
Altitude	700 to 1060 hPa	

Item (continued)	Specification (continued)
Shipping and storage conditions	
Temperature	-20° C to +49° C (-4° F to +120° F)
Relative humidity	15% to 95% noncondensing
Altitude	500 hPa to 1060 hPa
Intermittent operation	
Illuminator with speculum	≤ 10 minutes on, ≥ 5 minutes off between uses
Illuminator alone	≤ 2 minutes on, ≥ 5 minutes off between uses
Safety, EMC, and regulatory compliance	CAN/CSA C22.2 No. 601.1-M90, including amendments 1 & 2 EN/IEC 60601-1 EN/IEC 60601-1-2 EN/IEC 60825-1 UL 60601-1 AS/NZS CISPR11
LED radiation output	< 6.67 mW at 400 – 700 nm wavelengths

Part numbers

Item		Order Number <span>REF</span>
Cordless illuminator system with charging station		U.S. & Canada: 79910 International: 79915*
Cordless illuminator system with charging station and auxiliary power cord		U.S. & Canada: 79920 International: 79925*
Cordless illuminator		U.S. & Canada: 79900
Charging station (base and power cord)		U.S. & Canada: 73910 International: 73915*
Auxiliary power cord		U.S. & Canada: 75910 International: 75915*

\* Specify country and voltage.

## Limited warranty

Welch Allyn warrants that the KleenSpec vaginal speculum cordless illumination system products meet the labeled specifications of the Products and will be free from defects in materials and workmanship that occur within one year after the date of purchase.

The date of purchase is the date specified in our records, if you purchased the Product directly from us or 30 days after the date on which the Product was sold to the dealer from whom you bought the Product, as documented in our records.

This warranty does not cover damage caused by: 1) handling during shipping, 2) use or maintenance contrary to labeled instructions, 3) alteration or repair by anyone not authorized by Welch Allyn, and 4) accidents.

If a Product or accessory covered by this warranty is determined to be defective because of defective materials, components, or workmanship, and the warranty claim is made within the warranty period described above, Welch Allyn will, at its discretion, repair or replace the defective Product or accessory free of charge. If your Product requires repairs covered by this warranty, upon your request Welch Allyn will loan to you, at no cost, a substitute Product for use until your repaired Product is returned.

You must obtain a return authorization from Welch Allyn to return your Product before you send it to Welch Allyn's designated service center for repair. Contact Welch Allyn Technical Support.

THIS WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES, EXPRESS OR IMPLIED, INCLUDING BUT NOT LIMITED TO THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. WELCH ALLYN'S OBLIGATION UNDER THIS WARRANTY IS LIMITED TO REPAIR OR REPLACEMENT OF PRODUCTS CONTAINING A DEFECT. WELCH ALLYN IS NOT RESPONSIBLE FOR ANY INDIRECT OR CONSEQUENTIAL DAMAGES RESULTING FROM A PRODUCT DEFECT COVERED BY THE WARRANTY.

## Service policy

All repairs on products under warranty must be performed or approved by Welch Allyn. Unauthorized repairs will void the warranty. In addition, whether or not covered under warranty, any product repair shall exclusively be performed by Welch Allyn certified service personnel.

If the product fails to function properly — or if you need assistance, service, or spare parts — contact Welch Allyn.

Before contacting Welch Allyn, try to duplicate the problem, and check all accessories to ensure that they are not causing the problem. When calling, please be prepared to provide:

- Product name and model number and complete description of the problem.
- Serial number of your product (if applicable).
- Complete name, address and phone number of your facility.
- For out-of-warranty repairs or spare parts orders, a purchase order (or credit card) number.
- For parts orders, the required spare or replacement part numbers.

If your product requires warranty, extended warranty, or non-warranty repair service, please call Welch Allyn. A representative will assist you troubleshooting the problem and will make every effort to solve it over the phone, avoiding potential unnecessary returns.

In case a return cannot be avoided, the representative will record all necessary information and will provide a Return Material Authorization (RMA) number, as well as the appropriate return address. An RMA number must be obtained prior to any return.

If you have to return goods for service, follow these recommended packing instructions:

- Remove all hoses, cables, sensors, power cords, and ancillary products (as appropriate) before packing, unless you suspect they are associated with the problem.
- Wherever possible use the original shipping carton and packing materials.
- Include a packing list and the Welch Allyn Return Material Authorization (RMA) number.

It is recommended that all returned goods be insured. Claims for loss or damage to the product must be initiated by the sender.

## EMC guidance and manufacturer’s declarations

**Table 1. Emissions for all EQUIPMENT and SYSTEMS**

The 790 series cordless illumination system is intended for use in the electromagnetic environment specified below. The customer or user of the 790 series cordless illumination system should assure that it is used in such an environment.

Emissions test	Compliance	Electromagnetic environment - guidance
RF emissions CISPR 11	Group 1	The 790 series cordless illumination system uses RF energy only for its internal function. Therefore, its RF emissions are very low and are not likely to cause any interference in nearby electronic equipment.
RF emissions CISPR 11	Class B	
Harmonic emissions IEC 61000-3-2	Class A	
Voltage fluctuations/ flicker emissions IEC 61000-3-3	Complies	


**Table 2. Immunity for all EQUIPMENT and SYSTEMS**

The 790 series cordless illumination system is intended for use in the electromagnetic environment specified below. The customer or user of the 790 series cordless illumination system should assure that it is used in such an environment.

<b>Immunity test</b>	<b>IEC 60601 test level</b>	<b>Compliance level</b>	<b>Electromagnetic environment - guidance</b>
Electrostatic discharge (ESD) IEC 61000-4-2	± 6 kV contact ± 8 kV air	± 6 kV contact ± 8 kV air	Floors should be wood, concrete, or ceramic tile. If floors are covered with synthetic material, the relative humidity should be at least 30%.
Electrical fast transient (EFT)/burst IEC 61000-4-4	±2 kV mains ±1 kV I/O	±2 kV mains Not applicable	Mains power quality should be that of a typical commercial or hospital environment.
Surge IEC 61000-4-5	±1 kV differential ±2 kV common	±1 kV differential ±2 kV common	Mains power quality should be that of a typical commercial or hospital environment.
Voltage dips, short interruptions, and voltage variations on power supply input lines. IEC 61000-4-11	>95% dip in 0.5 cycle  60% dip in 5 cycles  30% dip for 25 cycles  >95% dip in 5 seconds	>95% dip in 0.5 cycle  60% dip in 5 cycles  30% dip for 25 cycles  >95% dip in 5 seconds	Mains power quality should be that of a typical commercial or hospital environment. If the user of the 790 series cordless illumination system requires continued operation during power mains interruptions, it is recommended that the 790 series cordless illumination system be powered from an uninterruptible power supply or battery.
Power frequency (50/60Hz) magnetic field IEC 61000-4-8	3 A/m	3 A/m	Power frequency magnetic fields should be at levels characteristic of a typical location in a typical commercial or hospital environment.

Table 3. Electromagnetic immunity

The 790 series cordless illumination system is intended for use in the electromagnetic environment specified below. The customer or user of the 790 series cordless illumination system should assure that it is used in such an environment.

Immunity test	IEC 60601 test level	Compliance level	Electromagnetic environment - guidance
Conducted RF, IEC 61000-4-6	3 Vrms 150 kHz to 80 MHz	3 Vrms	Portable and mobile RF communications equipment should be used no closer to any part of the 790 series cordless illumination system, including cables, than the recommended separation distance calculated from the equation applicable to the frequency of the transmitter.  <b>Recommended separation distance</b> $d = (1.17) \sqrt{P}$
Radiated RF, IEC 61000-4-3	3 V/m 80 MHz to 2.5 GHz	3 V/m	$d = (1.17) \sqrt{P}$ 80 MHz to 800 MHz $d = (2.33) \sqrt{P}$ 800 MHz to 2.5 GHz  where $P$ is the maximum output power rating of the transmitter in watts according to the transmitter manufacturer and $d$ is the recommended separation distance in meters.  Field strengths from fixed RF transmitters, as determined by an electromagnetic site survey, <sup>a</sup> should be less than the compliance level in each frequency range. <sup>b</sup>  Interference may occur in the vicinity of equipment marked with the following symbol:  



**Table 3. Electromagnetic immunity (continued)**

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Note 1: At 80 MHz and 800 MHz, the higher frequency range applies.

Note 2: These guidelines may not apply in all situations. Electromagnetic propagation is affected by absorption and reflection from structures, objects, and people.

<sup>a</sup> Field strengths from fixed transmitters, such as base stations for radio (cellular/cordless) telephones and land mobile radios, amateur radio, AM and FM radio broadcast and TV broadcast cannot be predicted theoretically with accuracy. To assess the electromagnetic environment due to fixed RF transmitters, an electromagnetic site survey should be considered. If the measured field strength in the location in which the 790 series cordless illumination system is used exceeds the applicable RF compliance level above, the 790 series cordless illumination system should be observed to verify normal operation. If abnormal performance is observed, additional measures may be necessary, such as reorienting or relocating the 790 series cordless illumination system.

<sup>b</sup> Over the frequency range 150 kHz to 80 MHz, field strengths should be less than 3 V/m.

**Table 4. Recommended separation distances between portable and mobile RF communications equipment and the 790 series cordless illumination system**

The 790 series cordless illumination system is intended for use in an electromagnetic environment in which radiated RF disturbances are controlled. The customer or user of the 790 series cordless illumination system can help prevent electromagnetic interference by maintaining a minimum distance between portable and mobile RF communications equipment (transmitters) and the 790 series cordless illumination system as recommended below, according to the maximum output power of the communications equipment.

Rated max. output power of transmitter (W)	Separation distance according to frequency of transmitter (m)		
	150 kHz to 80 MHz $d = (1.17) \sqrt{P}$	80 MHz to 800 MHz $d = (1.17) \sqrt{P}$	800 MHz to 2.5 GHz $d = (2.33) \sqrt{P}$
0.01	0.117	0.117	0.233
0.1	0.37	0.37	0.74
1	1.17	1.17	2.33
10	3.70	3.70	7.37
100	11.70	11.70	23.30

For transmitters rated at a maximum output power not listed above, the recommended separation distance  $d$  in meters (m) can be estimated using the equation applicable to the frequency of the transmitter, where  $P$  is the maximum output power rating of the transmitter in watts (W) according to the transmitter manufacturer.

Note 1: At 80 MHz and 800 MHz, the separation distance for the higher frequency range applies.

Note 2: These guidelines may not apply in all situations. Electromagnetic propagation is affected by absorption and reflection from structures, objects, and people.



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